CLAIMS

We claim:

1. A composite array composition comprising:
    a) a substrate with a surface comprising a plurality of assay locations, each assay location comprising a plurality of discrete sites; and
    b) a population of microspheres comprising at least a first and a second subpopulation, wherein each subpopulation comprises a bioactive agent;
    wherein said microspheres are distributed on each of said assay locations.

2. A composition according to claim 1 wherein each of said assay locations comprises a substantially similar set of bioactive agents.

3. A composition according to claim 1 wherein said substrate is a microtiter plate and each assay location is a microtiter well.

4. A composition according to claim 1 wherein each discrete site is a bead well.

5. A composition according to claim 1 wherein each of said subpopulations further comprise an optical signature capable of identifying said bioactive agent.

6. A composition according to claim 1 wherein each of said subpopulations further comprise an identifier binding ligand that will bind a decoder binding ligand such that the identification of the bioactive agent can be elucidated.

7. A composite array composition comprising:
    a) a first substrate with a surface comprising a plurality of assay locations;
    b) a second substrate comprising a plurality of array locations, each array location comprising discrete sites; and
    c) a population of microspheres comprising at least a first and a second subpopulation, wherein each subpopulation comprises a bioactive agent;
    wherein said microspheres are distributed on each of said array locations.

8. A composition according to claim 7 wherein said first substrate is a microtiter plate.

9. A composition according to claim 7 or 8 wherein said second substrate comprises a plurality of fiber optic bundles comprising a plurality of individual fibers, each bundle comprising an array location, and each individual fiber comprising a bead well.

10. A composition according to claim 7 wherein each of said subpopulations further comprise an optical signature capable of identifying said bioactive agent.

11. A composition according to claim 7 wherein each of said subpopulations further comprise an identifier binding ligand that will bind a decoder binding ligand such that the identification of the bioactive agent can be elucidated.

12. A method of decoding an array composition comprising

a) providing an array composition comprising:

i) a substrate with a surface comprising a plurality of assay locations, each assay location comprising discrete sites; and

ii) a population of microspheres comprising at least a first and a second subpopulation, wherein each subpopulation comprises a bioactive agent;

wherein said microspheres are distributed on said sites;

b) adding a plurality of decoding binding ligands to said array composition to identify the location of at least a plurality of the bioactive agents.

13. A method of decoding an array composition comprising

a) providing an array composition comprising:

i) a substrate with a surface comprising a plurality of array locations, each array location comprising discrete sites; and

ii) a population of microspheres comprising at least a first and a second subpopulation, wherein each subpopulation comprises a bioactive agent;

wherein said microspheres are distributed on said sites;

b) adding a plurality of decoding binding ligands to said array composition to identify the location of at least a plurality of the bioactive agents.

14. A method according to claim 12 or 13 wherein at least one subpopulation of microspheres comprises an identifier binding ligand to which a decoding binding ligand can bind.

15. A method according to claim 12 or 13 wherein said decoding binding ligands bind to said bioactive agents.

16. A method according to claim 12 or 13 wherein said decoding binding ligands are labeled.

17. A method according to claim 12 or 13 wherein the location of each subpopulation is determined.

18. A method of determining the presence of one or more target analytes in one or more samples comprising:

a) contacting said sample with a composition comprising:

i) a substrate with a surface comprising a plurality of assay locations, each assay location comprising discrete sites; and

ii) a population of microspheres comprising at least a first and a second subpopulation each comprising a bioactive agent;

wherein said microspheres are distributed on said surface such that said discrete sites contain microspheres; and

b) determining the presence or absence of said target analyte.

19. A method of determining the presence of one or more target analytes in one or more samples comprising:

a) adding said sample to a first substrate comprising a plurality of assay locations, such that said sample is contained at a plurality of said assay locations;

b) contacting said sample with a second substrate comprising:

i) a surface comprising a plurality of array locations, each array location comprising discrete sites; and

ii) a population of microspheres comprising at least a first and a second subpopulation each comprising a bioactive agent;

wherein said microspheres are distributed on said surface such that said discrete sites contain microspheres; and

b) determining the presence or absence of said target analyte.